BEC 950-007 DATA CARTRIDGE

UTOMATIC CALIBRATION FOR THE MODEL

USING THE HP9825A

BOONTON ELECTRONICS CORPORATION

MP MASTER

MA25190

BEC 950-007 DATA CARTRIDGE

SEMI-AUTOMATIC CALIBRATION FOR THE MODEL 4200

USING THE HP9825A

950-007

281

BOONTON ELECTRONICS CORPORATION

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SECTION I

INTRODUCTION

The 950-007 data cartridge is a software support package for the semi-automatic calibration of the Boonton Model 4200 RF Microwattmeter, using the HP 9825A calculator as a GPIB controller.

These programs may replace comparable calibration procedures as found in the maintenance section of the instrument manual. The user should be familiar with the maintenance section of the 4200 manual prior to using this tape.

As with any software, there is always improvement possible. Users are encouraged to alter prompts and instructions as required; however, the mathematical portion of these programs should not be altered.

The 950-007 requires a 4200 GPIB interface option (Option -01) and an HP 9825A with the general/extended I/O ROM and the string variable ROM.

SECTION II

INSTRUCTIONS FOR USE

With power off to the HP 9825A, install the tape cartridge in the tape drive and turn the power on. The calculator will display "REMOVE 4200 BIT SWITCH". After the bit switch is removed, press [CONTINUE]. Program 0 will load, printing a menu and loading special function keys as follows: f5: mode 0 - operate, f7: mode 1 - dc cal., and f8: mode 2 - ac cal.

To load any program into active memory of the HP 9825A, press [LOAD] [n] [EXECUTE] [RUN] where n is the program number. The calculator will halt the program when data must be entered by the user. After data entry the [CONTINUE] key should be pressed to run the program.

Table 1 is a brief description of the programs contained on the tape. A complete program listing is also supplied.

TABLE I

PROGRAM	FUNCTION
0	Prints program list and loads special function keys.
1	Test of the GPIB interface PC board. Insures proper operation of all data and handshake lines. This test must pass for other programs to function.
2	DC calibration for one or two input channels using the Model 2500. Calculator prompts user to change ranges on the 2500 without halting the program. The user has 10 seconds to complete range switching. Failure to do so will cause incorrect calibration.

TABLE I (Continued)

PROGRAM	FUNCTION
3	N4240A AC CAL - 50 MHz range calibration using Model 2510 or a 50 MHz source.
4	N4241A AC CAL - 50 MHz range calibration.
5	-4 SERIES AC CAL - range calibration using Model 25A.
6	-5 SERIES AC CAL.
7	N4240A CHECK OF CAL.
8	N4241A CHECK OF CAL.
9	-4 SERIES CHECK OF CAL
10	-5 SERIES CHECK OF CAL.
11	Recorder out adjustment - establishes recorder gain constant for all channels.
12	Enter A Cal Factor. For 4200-4A Sensor.
13	Enter B Cal Factor. For 4200-4B Sensor.
14	Load C Cal Factor. For 4200-4C Sensor.
15	Enter E; N4240A; N4241A Cal Factor. For 4200-4E and thermal Sensors.
16	PRINOUT - external printer - duplicates cal sheet as found under the right side cover of the Model 4200.
17	Re-enter data from printout.

TABLE I (Continued)

PROGRAM	FUNCTION
18	SENSOR PRINTOUT - 9825A printer. Same as 16 but outputs on the 9825A printer for Cal Factor information.
19	4200 DATA - 9825A printer - dc and ac range cal. Information output on calculator printer.

4200 PROGRAM PRINTOUT
FOR 9825A

PROGRAM 0,ldf 0:PRINTS PROGRAM LIST & LOADS SPECIAL FUNCTION KEYS

```
0: beep;dsp "REMOVE 4200 BIT SWITCH";stp
1: prt "4200 PROGRAM";prt "LIST";spc 3
2: prt "PROGRAM 0"
3: prt "PRINTS PROGRAM";prt "LIST & LOADS","SPECIAL FUNCTION","KEYS";spc 2
4: prt "PROGRAM 1";prt "INTERFACE TEST";spc 2
5: prt "PROGRAM 2";prt "D.C. CALIBRATION";spc 2
6: prt "PROGRAM 3";prt "N4240A A.C. CAL.";spc 2
7: prt "PROGRAM 4","N4241A A.C. CAL.";spc 2
8: prt "PROGRAM 5","4 SERIES A.C.CAL";spc 2
9: prt "PROGRAM 6","5 SERIES A.C.CAL";spc 2
10: prt "PROGRAM 7","N4240A","CHECK OF CAL.";spc 2
11: prt "PROGRAM 8","N4241A","CHECK OF CAL.";spc 2
12: prt "PROGRAM 9","4 SERIES","CHECK OF CAL.";spc 2
13: prt "PROGRAM 10","5 SERIES","CHECK OF CAL.";spc 2
14: prt "PROGRAM 11","RECORDER OUT","ADJUSTMENT";spc 2
15: prt "PROGRAM 12","ENTER A CAL FACT";spc 2
16: prt "PROGRAM 13","ENTER B CAL FACT";spc 2
17: prt "PROGRAM 14","LOAD C CAL FACT";spc 2
18: prt "PROGRAM 15","ENTER E;N4240A;","N4241A CAL FACT";spc 2
19: prt "PROGRAM 16","PRINTOUT","EXT. PRINTER";spc 2
20: prt "PROGRAM 17","RE-ENTER DATA","FROM PRINTOUT";spc 2
21: prt "PROGRAM 18","SENSOR PRINTOUT","9825A PRINTER";spc 3
22: prt "PROGRAM 19","4200 DATA PRINT","9825A PRINTER";spc 3
23: trk 1;ldk 10;trk 0
*31682
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PROGRAM 1,ldf 1:INTERFACE TEST


 0: trk 1;ldk 10;trk 0
 1: ent "4200 SELECT CODE?",P
 2: cli 7
 3: time 500;on err "BEAT"
 4: dsp "CHECK LSN,ATN,REM,TLK NOT LIT";stp
 5: wrt P,"81M1N1S"
 6: for X=1 to 10
 7: wrt P,"81M0000.AA"
 8: red P,A,B,C;fxd 0;dsp "A=",A,"    X=",X,"          ","B=",B
 9: if A#0;gto "BEAT"
10:  if B#0;gto "BEAT"
11: wrt P,"81M1111AA"
12: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
13: if A#1111;gto "BEAT"
14: if B#0;gto "BEAT"
15: wrt P,"81M2222AA"
16: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
17: if A#2222;gto "BEAT"
18: if B#0;gto "BEAT"
19: wrt P,"81M3333AA"
20: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
21: if A#3333;gto "BEAT"
22: if B#0;gto "BEAT"
23: wrt P,"81M4444AA"
24: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
25: if A#4444;gto "BEAT"
26: if B#0;gto "BEAT"
27: wrt P,"81M5555AA"
28: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
29: if A#5555;gto "BEAT"
30: if B#0;gto "BEAT"
31: wrt P,"81M6666AA"
32: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
33: if A#6666;gto "BEAT"
34: if B#0;gto "BEAT"
35: wrt P,"81M7777AA"
36: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
37: if A#7777;gto "BEAT"
38: if B#0;gto "BEAT"
39: wrt P,"81M8888AA"
40: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
41: if A#8888;gto "BEAT"
42: if B#0;gto "BEAT"
43: wrt P,"81M9999AA"
44: red P,A,B,C;fxd 0;dsp "A=",A,"X=",X,"          ","B=",B
45: if A#9999;gto "BEAT"
46: if B#0;gto "BEAT"
47: next X
48: beep;wait 100;beep;wait 100;beep
49: dsp "INTERFACE PCB IS OK";wrt P,"1000A";wrt P,"80MAP";cli 7;end
50: "BEAT":beep;wait 1000;beep;wait 1000;beep;wait 1000;beep
51: dsp "SOMETHING WRONG,MAYBE INTERFACE";end
*15394
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PROGRAM 2,ldf 2:D.C.CALIBRATION


0: prt "D.C.CAL"
1: enp "4200 SEL.CODE?",P
2: wait 1300;beep;enp "CHANNEL?",T
3: wrt P,T,"N81M1000A3723L36.85B"
4: beep;wait 200;beep
5: fxd 0;dsp "CONNECT 2500 TO CHANNEL",T;stp
6: beep;dsp "SET 2500 TO 500K AND RANGE 0";stp
7: beep;dsp "DEPRESS 2500 ZERO BUTTON";stp
8: dsp "ZERO SETTLING TIME"
9: wait 10000;dsp "ZEROING";wrt P,"Z"
10: beep;dsp "RELEASE 2500 ZERO BUTTON";stp
11: for X=E to 5;beep;wait 100;beep;dsp "SET 2500 TO RANGE",X;wait 1000;beep
12: wait 1000;beep;wait 1000;beep;wait 100;beep
13: dsp "RANGE",X,"SETTLING TIME"
14: wrt P,X,"O";wrt P,"P";wait (7-X)2000
15: if X>1;30}D;gto +3
16: if X=0;300}D
17: if X=1;100}D
18: wrt P,"81MAP"
19: for G=1 to D;red P,A,B,F;A+C}C
20: dsp "TRY #",G,"OF",D,"  AVG",1000000C/G;next G
21: C/10D}J;.3685/J}J;0}C;wrt P,J,"R";prt J;gto 22
22: if J>1025;gto "check"
23: if J<975;gto "check"
24: if X=5;gto "range 5"
25: next X
26: for Y=1 to 5;beep;wait 100;next Y;wrt P,"80M";wrt P,"AP"
27: prt "Done";dsp "FINISHED";spc 3;gto "BEEP"
28: "check":if X#0;gto "beat"
29: if J>1050;gto "beat"
30: if J<950;gto "beat"
31: next X
32: "beat":for R=1 to 10;beep;wait 100;next R
33: if X=0;dsp "SOMETHING IS WRONG SOMEWHERE";stp
34: dsp "SOMETHING WRONG WITH RANGE",X;stp
35: X}E;gto 11
36: "range 5":if J<1002;if J>998;gto "RANGE 6"
37: dsp "READJUST R1+R11 ON INPUT PCB",T;stp
38: "RANGE 6":dsp "SET 2500 TO RANGE 6A";wait 1000;beep
39: wait 1000;beep;wait 1000;beep;wait 100;beep
40: dsp "RANGE 6A SETTLING TIME";6}X;gto 14
41: "BEEP":wrt P,"80MORODAB";cli 7
42: dsp "FINISHED---SET 2500 TO ZERO"
43: for X=1 to 10;beep;wait 100;next X
44: wait 20000;gto -1
*2222
```

PROGRAM 3,ldf 3:N4240A A.C.CALIBRATION

```
0: prt "4240A A.C. CAL"
1: enp "4200 SEL. CODE?",P
2: fxd 0
3: ent "CHANNEL IN USE?",F;prt "CHANNEL",F;wrt P,F,"N"
4: ent "SENSOR TO BE CALIBRATED?",G;prt "SENSOR",G;wrt P,G,"S"
5: wrt P,"81M1000A3850D131F"
6: ent "SENSOR SERIAL#?",H;wrt P,H,"H"
7: wrt P,"82M"
8: dsp "CONNECT 4240A TO 2510 CALIBRATOR";stp
9: dsp "SET MAIN ATTENUATOR TO -20";stp
10: dsp "SET SUB-ATTENUATOR TO 100%F.S.";stp
11: dsp "DEPRESS 2510 ZERO BUTTON";stp
12: dsp "WAIT--2MIN. ZERO SETTLING TIME";for X=1 to 4;wait 30000;next X
13: dsp "ZEROING";wrt P,"Z";for X=1 to 5;beep;wait 100;next X
14: dsp "RELEASE 2510 ZERO BUTTON";stp ;wrt P,"000H99.99B"
15: dsp "RANGE 0 CAL.";wait 15000
16: for X=1 to 75;wrt P,"KR";red P,A,B,C;wrt P,"P";A+D}D;next X
17: spc 1;prt D/75;wrt P,D/75,"R";0}D
18: for X=1 to 5;beep;wait 100;next X
19: dsp "SET MAIN ATTENUATOR TO -10";stp ;wrt P,"100H"
20: dsp "RANGE 1 CAL";wait 10000;wrt P,"K"
21: -16}Z;gsb "downscale"
22: dsp "SET MAIN ATTENUATOR TO 0dB.";stp ;wrt P,"200H"
23: dsp "RANGE 2 CAL.";wait 5000;wrt P,"K"
24: -6}Z;gsb "downscale"
25: dsp "SET MAIN ATTENUATOR TO 10dB.";stp ;wrt P,"300H"
26: dsp "RANGE 3 CAL.";wait 5000;wrt P,"K"
27: 4}Z;gsb "downscale"
28: wrt P,"82M400R0H500R0H600R"
29: wrt P,"80M0R0DAB";dsp "FINISHED";prt "Done";cli 7;spc 3;gto "BEEP"
30: "downscale":for X=1 to 5;beep;wait 100;next X
31: dsp "SET SUB-ATTENUATOR TO 25.1% F.S";stp
32: dsp "DOWNSCALE CAL."
33: if Z=-16;wait 12000
34: wrt P,"80MAP";wait 5000
35: for X=1 to 10;red P,H,I,J;H+F}F;next X;F/10}H;0}F
36: 10log(H)}H
37: wrt P,"82M"
38: if H>Z+.005;wrt P,"H";red P,H,I,J;wrt P,H-3,"H";gto 34
39: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 34
40: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 34
41: for X=1 to 5;beep;wait 100;next X
42: dsp "SET SUB-ATTENUATOR TO 100%F.S.";stp ;ret
43: "BEEP":for X=1 to 10;beep;wait 100;next X
44: wait 20000;gto -1
*7588
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PROGRAM 4,ldf 4:N4241A A.C.CALIBRATION


0: prt "4241A A.C. CAL"
1: enp "4200 SEL. CODE?",P
2: fxd 0
3: ent "CHANNEL IN USE?",F;prt "CHANNEL",F;wrt P,F,"N"
4: ent "SENSOR TO BE CALIBRATED?",G;prt "SENSOR",G;wrt P,G,"S"
5: wrt P,"81M1000A3850D132F"
6: ent "SENSOR SERIAL#?",H;wrt P,H,"H"
7: wrt P,"82M"
8: dsp "CONNECT 4241A TO 2510 CALIBRATOR";stp
9: dsp "SET MAIN ATTENUATOR TO -10";stp
10: dsp "SET SUB-ATTENUATOR TO 100%F.S.";stp
11: dsp "DEPRESS 2510 ZERO BUTTON";stp
12: dsp "WAIT--2MIN. ZERO SETTLING TIME";for X=1 to 4;wait 30000;next X
13: dsp "ZEROING";wrt P,"Z";for X=1 to 5;beep;wait 100;next X
14: dsp "RELEASE 2510 ZERO BUTTON";stp ;wrt P,"000H99.99B"
15: dsp "RANGE 0 CAL.";wait 15000
16: for X=1 to 75;wrt P,"KR";red P,A,B,C;wrt P,"P";A+D)D;next X
17: spc 1;prt D/75;wrt P,D/75,"R";0)D
18: for X=1 to 5;beep;wait 100;next X
19: dsp "SET MAIN ATTENUATOR TO 0";stp ;wrt P,"100H"
20: dsp "RANGE 1 CAL";wait 10000;wrt P,"K"
21: -6)Z;gsb "downscale"
22: dsp "SET MAIN ATTENUATOR TO 10dB.";stp ;wrt P,"200H"
23: dsp "RANGE 2 CAL.";wait 5000;wrt P,"K"
24: 4)Z;gsb "downscale"
25: dsp "SET MAIN ATTENUATOR TO 20dB.";stp ;wrt P,"300H"
26: dsp "RANGE 3 CAL.";wait 5000;wrt P,"K"
27: 14)Z;gsb "downscale"
28: wrt P,"82M400R0H500R0H600R"
29: wrt P,"80M0R0DAB";dsp "FINISHED";prt "Done";cli 7;spc 3;gto "BEEP"
30: "downscale":for X=1 to 5;beep;wait 100;next X
31: dsp "SET SUB-ATTENUATOR TO 25.1% F.S";stp
32: dsp "DOWNSCALE CAL."
33: if Z=-6;wait 12000
34: wrt P,"80MAP";wait 5000
35: for X=1 to 10;red P,H,I,J;H+F)F;next X;F/10)H;0)F
36: 10log(H)}H
37: wrt P,"82M"
38: if H>Z+.005;wrt P,"H";red P,H,I,J;wrt P,H-3,"H";gto 34
39: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 34
40: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 34
41: for X=1 to 5;beep;wait 100;next X
42: dsp "SET SUB-ATTENUATOR TO 100%F.S.";stp ;ret
43: "BEEP":for X=1 to 10;beep;wait 100;next X
44: wait 20000;gto -1
*23713
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PROGRAM 5,1df 5:4 SERIES A.C.CALIBRATTION

```
0: prt "4 SERIES"
1: prt "A.C.CAL."
2: enp "4200 SEL. CODE?",P
3: fxd 0
4: ent "CHANNEL IN USE?",F;prt "CHANNEL",F;wrt P,F,"N"
5: ent "SENSOR TO BE CALIBRATED?",G;prt "SENSOR",G;wrt P,G,"S"
6: wrt P,"81M1000A1000DOF"
7: ent "SENSOR SERIAL#?",H;wrt P,H,"H"
8: wrt P,"82M"
9: dsp "CONNECT SENSOR TO 25A CALIBRATOR";stp
10: dsp "SET 25A TO -54dBm";stp
11: dsp "DEPRESS 25A ZERO BUTTON";stp
12: dsp "WAIT---- ZERO SETTLING TIME";for X=1 to 2;wait 30000;next X
13: dsp "ZEROING";wrt P,"Z";for X=1 to 5;beep;wait 100;next X
14: dsp "RELEASE 25A ZERO BUTTON";stp ;wrt P,"000H39.80B"
15: dsp "RANGE 0 CAL.";wait 30000
16: for X=1 to 75;wrt P,"KR";red P,A,B,C;wrt P,"P";A+D}D;next X
17: spc 1;prt D/75;wrt P,D/75,"R";0}D
18: for X=1 to 5;beep;wait 100;next X
19: dsp "SET 25A TO -44dBm";stp ;wrt P,"100H"
20: dsp "RANGE 1 CAL.";wait 25000;wrt P,"K"
21: -50}Z;for X=1 to 5;beep;wait 100;next X
22: dsp "SET 25A to -50dBm";stp
23: gsb "downscale"
24: dsp "SET 25A TO -34dBm";stp ;wrt P,"200H"
25: dsp "RANGE 2 CAL.";wait 25000;wrt P,"K"
26: -40}Z;for X=1 to 5;beep;wait 100;next X
27: dsp "SET 25A TO -40dBm";stp
28: gsb "downscale"
29: dsp "SET 25A TO -24dBm";stp ;wrt P,"300H"
30: dsp "RANGE 3 CAL.";wait 5000;wrt P,"K"
31: -30}Z;for X=1 to 5;beep;wait 100;next X
32: dsp "SET 25A TO -30dBm";stp
33: gsb "downscale"
34: dsp "SET 25A TO -14dBm";stp ;wrt P,"400H"
35: dsp "RANGE 4 CAL.";wait 5000;wrt P,"K"
36: -20}Z;for X=1 to 5;beep;wait 100;next X
37: dsp "SET 25A TO -20dBm";stp
38: gsb "downscale"
39: dsp "SET 25A TO 0dBm";stp ;wrt P,"500H99.99B"
40: dsp "RANGE 5 CAL.";wait 5000;wrt P,"K"
41: -10}Z;for X=1 to 5;beep;wait 100;next X
42: dsp "SET 25A TO -10dBm";stp
43: gsb "downscale"
44: dsp "SET 25A TO 10dbm";stp ;wrt P,"600H"
45: dsp "RANGE 6 CAL.";wait 5000;wrt P,"K"
46: wrt P,"80MORODAB";dsp "DONE";prt "DONE";cli 7;spc 3;gto "BEEP"
47: "downscale":dsp "DOWNSCALE CAL."
48: if Z=-50;wait 15000
49: if Z=-40;wait 15000
50: wrt P,"80MAP";wait 5000
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51: for X=1 to 10;red P,H,I,J;H+F>F;next X;F/10>H;0>F
52: 10log(H)>H
53: wrt P,"82M"
54: if H>Z+.005;wrt P,"H";red P,H,I,J;wrt P,H-3,"H";gto 50
55: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 50
56: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 50
57: for X=1 to 5;beep;wait 100;next X;ret
58: "BEEP":for X=1 to 10;beep;wait 100;next X
59: wait 20000;gto -1
*11465
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PROGRAM 6,1df 6:5 SERIES A.C.CALIBRATION

```
0: prt "5 SERIES"
1: prt "A.C.CAL."
2: enp "4200 SEL. CODE?",P
3: fxd 0
4: ent "CHANNEL IN USE?",F;prt "CHANNEL",F;wrt P,F,"N"
5: ent "SENSOR TO BE CALIBRATED?",G;prt "SENSOR",G;wrt P,G,"S"
6: wrt P,"81M1000A1000D1F"
7: ent "SENSOR SERIAL#?",H;wrt P,H,"H"
8: wrt P,"82M"
9: dsp "CONNECT SENSOR TO 25A CALIBRATOR";stp
10: dsp "SET 25A TO -44dBm";stp
11: dsp "DEPRESS 25A ZERO BUTTON";stp
12: dsp "WAIT---- ZERO SETTLING TIME";for X=1 to 4;wait 30000;next X
13: dsp "ZEROING";wrt P,"Z";for X=1 to 5;beep;wait 100;next X
14: dsp "RELEASE 25A ZERO BUTTON";stp ;wrt P,"000H39.80B"
15: dsp "RANGE 0 CAL.";wait 30000
16: for X=1 to 75;wrt P,"KR";red P,A,B,C;wrt P,"P";A+D)D;next X
17: spc 1;prt D/75;wrt P,D/75,"R";0)D
18: for X=1 to 5;beep;wait 100;next X
19: dsp "SET 25A TO -34dBm";stp ;wrt P,"100H"
20: dsp "RANGE 1 CAL.";wait 25000;wrt P,"K"
21: -40)Z;for X=1 to 5;beep;wait 100;next X
22: dsp "SET 25A to -40dBm";stp
23: gsb "downscale"
24: dsp "SET 25A TO -24dBm";stp ;wrt P,"200H"
25: dsp "RANGE 2 CAL.";wait 25000;wrt P,"K"
26: -30)Z;for X=1 to 5;beep;wait 100;next X
27: dsp "SET 25A TO -30dBm";stp
28: gsb "downscale"
29: dsp "SET 25A TO -14dBm";stp ;wrt P,"300H"
30: dsp "RANGE 3 CAL.";wait 5000;wrt P,"K"
31: -20)Z;for X=1 to 5;beep;wait 100;next X
32: dsp "SET 25A TO -20dBm";stp
33: gsb "downscale"
34: dsp "SET 25A TO -4dBm";stp ;wrt P,"400H"
35: dsp "RANGE 4 CAL.";wait 5000;wrt P,"K"
36: -10)Z;for X=1 to 5;beep;wait 100;next X
37: dsp "SET 25A TO -10dBm";stp
38: gsb "downscale"
39: dsp "SET 25A TO 10dBm";stp ;wrt P,"500H99.99B"
40: dsp "RANGE 5 CAL.";wait 5000;wrt P,"K"
41: 0)Z;for X=1 to 5;beep;wait 100;next X
42: dsp "SET 25A TO 0dBm";stp
43: gsb "downscale"
44: dsp "SET 25A TO 20dbm";stp ;wrt P,"600H"
45: dsp "RANGE 6 CAL.";wait 5000;wrt P,"K"
46: wrt P,"80MORODAB";dsp "DONE";prt "DONE";cli 7;spc 3;gto "BEEP"
47: "downscale":dsp "DOWNSCALE CAL."
48: if Z=-40;wait 15000
49: if Z=-30;wait 15000
50: wrt P,"80MAP";wait 5000
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51: for X=1 to 10;red P,H,I,J;H+F)F;next X;F/10)H;0)F
52: 10log(H))H
53: wrt P,"82M"
54: if H>Z+.005;wrt P,"H";red P,H,I,J;wrt P,H-3,"H";gto 50
55: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 50
56: if H<Z-.005;wrt P,"H";red P,H,I,J;wrt P,H+2,"H";gto 50
57: for X=1 to 5;beep;wait 100;next X;ret
58: "BEEP":for X=1 to 10;beep;wait 100;next X
59: wait 20000;gto -1
*11465
```

```
PROGRAM 7,ldf 7:N4240A CHECK OF CALIBRATION


0: prt "CHECK OF 4240"
1: enp "4200 SEL. CODE?",P
2: fxd 0
3: ent "CHANNEL?",D;ent "SENSOR?",E
4: prt "CHANNEL",D;prt "SENSOR",E
5: wrt P,D,"N";wrt P,E,"S";wrt P,"80MORODAP"
6: dsp "SET MAIN ATTENUATOR TO 0";stp
7: dsp "SET SUB ATTENUATOR TO 100% F.S.";stp
8: dsp "DEPRESS 2510 ZERO BUTTON";stp
9: dsp "WAIT--ZERO SETTLING TIME";wait 20000
10: dsp "ZEROING";wrt P,"Z"
11: for X=1 to 5;beep;wait 100;next X
12: dsp "RELEASE 2510 ZERO BUTTON";stp
13: wait 5000;dsp "1 MILLIWATT CAL. "
14: wrt P,"80MAP";wait 5000
15: wrt P,"K";wait 2000;for X=1 to 20;red P,A,B,H;A+C)C;next X;C/20)A
16: if A>1.00045;0)A)C;gto -1
17: if A<.99965;0)A)C;gto -2
18: 0)A)C
19: for X=1 to 5;beep;wait 100;next X;dsp "SET MAIN ATTENUATOR TO -20";stp
20: dsp "SET SUB-ATTENUATOR TO 31.6% F.S.";stp
21: dsp "DEPRESS 2510 ZERO BUTTON";stp
22: wrt P,"81MA";red P,A,B,H;prt "AUTO=",A;wrt P,"80MAPOROD"
23: dsp "RESETTLE TO ZERO";wait 30000
24: wait 30000;wait 30000;dsp "REZEROING"
25: wrt P,"Z";spc 1
26: 5)G;for X=1 to 5;beep;wait 100;next X
27: beep;dsp "RELEASE 2510 ZERO BUTTON";stp
28: fxd 0;0)J;for M=4 to 8;8-M)Z
29: for N=0 to 5 by G;5-N)Y
30: spc 1;fxd 3;0)C;dsp "CHECKING--WAIT"
31: wait 3000;if Z>1;wait 4000;if Z>3;wait 9000;gto +2
32: for J=1 to 10;red P,A,B,H;A+C)C;next J;C/10)C;gto 34
33: for J=1 to 40;red P,A,B,H;A+C)C;next J;C/40)C;gto 66
34: flt 3;prt "WATTS",C;10log(C))C;jmp Y+1
35: .05)I;gto "compare"
36: .05)I;gto "compare"
37: .06)I;gto "compare"
38: .07)I;gto "compare"
39: .07)I;gto "compare"
40: .08)I;gto "compare"
41: .08)I;gto "compare"
42: .09)I;gto "compare"
43: .09)I;gto "compare"
44: .1)I;gto "compare"
45: "compare":fxd 3;prt "dBm",C,"STD",-(Y+Z10-20),"TOL",I
46: if C<-10Z+20-Y-I;spc 1;gto 54
47: if C>-10Z-Y+20+I;spc 1;gto 54
48: for X=1 to 5;beep;wait 100;next X
49: if Z+Y#1;if Y=0;dsp "SET SUB ATTENUATOR TO 31.6% F.S";stp
50: if Z+Y#1;if Y=0;fxd 0;dsp "SET MAIN ATTEN. TO",-10Z+30;stp ;fxd 3;next M
```

```
51: if Z+Y#1;if Y=5;dsp "SET SUB-ATTEN TO 100% F.S.";stp ;next N
52: if Z+Y=1;prt "TEST COMPLETE";wrt P,"80MAB"
53: cli 7;gto "BEEP"
54: 1)K;spc 1;prt "FAILED";fxd 3;spc 1;if M=4;gto 57
55: if M=5;if Y=9;gto 57
56: gto 63
57: if F=4;prt "Unit isn't working properly";end
58: 1+F)F;0)K;prt "RESTART"
59: dsp "SET 2510 MAIN ATTENUATOR TO -20";stp ;spc 1
60: dsp "SET SUB-ATTENUATOR TO 31.6% F.S.";stp
61: dsp "DEPRESS 2510 ZERO BUTTON";stp
62: gto 23
63: if Z+Y=21;gto 52
64: if Y=0;gto 49
65: if Y=5;gto 51
66: flt 3;prt "WATTS",C;10log(C)}C;jmp Y+1
67: .1)I;gto "compare"
68: .2)I;gto "compare"
69: .3)I;gto "compare"
70: .4)I;gto "compare"
71: .5)I;gto "compare"
72: .6)I;gto "compare"
73: .7)I;gto "compare"
74: .8)I;gto "compare"
75: .9)I;gto "compare"
76: 1)I;gto "compare"
77: "BEEP":if K=0;prt "PASSES TEST";spc 3
78: if K=1;prt "FAILS TEST";spc 3
79: for X=1 to 10;beep;wait 100;next X
80: dsp "FINISHED";wait 20000;gto 79
*21699
```

```
PROGRAM 8,1df 8:N4241A CHECK OF CALIBRATION


0: prt "CHECK OF 4241"
1: enp "4200 SEL. CODE?",P
2: fxd 0
3: ent "CHANNEL?",D;ent "SENSOR?",E
4: prt "CHANNEL",D;prt "SENSOR",E
5: wrt P,D,"N";wrt P,E,"S";wrt P,"80MORODAP"
6: dsp "SET MAIN ATTENUATOR TO 0";stp
7: dsp "SET SUB ATTENUATOR TO 100% F.S.";stp
8: dsp "DEPRESS 2510 ZERO BUTTON";stp
9: dsp "WAIT--ZERO SETTLING TIME";wait 20000
10: dsp "ZEROING";wrt P,"Z"
11: for X=1 to 5;beep;wait 100;next X
12: dsp "RELEASE 2510 ZERO BUTTON";stp
13: wait 5000;dsp "1 MILLIWATT CAL. "
14: wrt P,"80MAP";wait 5000
15: wrt P,"K";wait 2000;for X=1 to 20;red P,A,B,H;A+C}C;next X;C/20}A
16: if A>1.00045;0}A}C;gto -1
17: if A<.99965;0}A}C;gto -2
18: 0}A}C
19: for X=1 to 5;beep;wait 100;next X;dsp "SET MAIN ATTENUATOR TO -10";stp
20: dsp "SET SUB-ATTENUATOR TO 31.6% F.S.";stp
21: dsp "DEPRESS 2510 ZERO BUTTON";stp
22: wrt P,"81MA";red P,A,B,H;prt "AUTO=",A;wrt P,"80MAPOROD"
23: dsp "RESETTLE TO ZERO";wait 30000
24: wait 30000;wait 30000;dsp "REZEROING"
25: wrt P,"Z";spc 1
26: 5}G;for X=1 to 5;beep;wait 100;next X
27: dsp "RELEASE 2510 ZERO BUTTON";stp
28: fxd 0;0}J;for M=5 to 8;8-M}Z
29: for N=0 to 5 by G;5-N}Y
30: spc 1;fxd 3;0}C;dsp "CHECKING--WAIT"
31: wait 3000;if Z>0;wait 4000;if Z>2;wait 9000;gto +2
32: for J=1 to 10;red P,A,B,H;A+C}C;next J;C/10}C;gto 34
33: for J=1 to 40;red P,A,B,H;A+C}C;next J;C/40}C;gto 66
34: flt 3;prt "WATTS",C;10log(C)}C;jmp Y+1
35: .05}I;gto "compare"
36: .05}I;gto "compare"
37: .06}I;gto "compare"
38: .07}I;gto "compare"
39: .07}I;gto "compare"
40: .08}I;gto "compare"
41: .08}I;gto "compare"
42: .09}I;gto "compare"
43: .09}I;gto "compare"
44: .1}I;gto "compare"
45: "compare":fxd 3;prt "dBm",C,"STD",-(Y+Z10-20),"TOL",I
46: if C<-10Z+20-Y-I;spc 1;gto 54
47: if C>-10Z-Y+20+I;spc 1;gto 54
48: for X=1 to 5;beep;wait 100;next X
49: if Z+Y#0;if Y=0;dsp "SET SUB ATTENUATOR TO 31.6% F.S";stp
50: if Z+Y#0;if Y=0;fxd 0;dsp "SET MAIN ATTEN. TO",-10Z+30;stp ;fxd 3;next M
```

```
51: if Z+Y#0;if Y=5;dsp "SET SUB-ATTEN TO 100% F.S.";stp ;next N
52: if Z+Y=0;prt "TEST COMPLETE";wrt P,"80MAB"
53: cli 7;gto "BEEP"
54: 1)K;spc 1;prt "FAILED";fxd 3;spc 1;if M=5;gto 57
55: if M=6;if Y=9;gto 57
56: gto 64
57: if F=4;prt "Unit isn't working properly";end
58: 1+F)F;0)K;prt "RESTART"
59: dsp "SET 2510 MAIN ATTENUATOR TO-10";stp ;spc 1
60: dsp "SET SUB-ATTENUATOR TO 31.6% F.S.";stp
61: dsp "DEPRESS 2510 ZERO BUTTON";stp
62: gto 23
63: if Z+Y=0;gto 52
64: if Y=0;gto 49
65: if Y=5;gto 51
66: flt 3;prt "WATTS",C;10log(C))C;jmp Y+1
67: .1)I;gto "compare"
68: .2)I;gto "compare"
69: .3)I;gto "compare"
70: .4)I;gto "compare"
71: .5)I;gto "compare"
72: .6)I;gto "compare"
73: .7)I;gto "compare"
74: .8)I;gto "compare"
75: .9)I;gto "compare"
76: 1)I;gto "compare"
77: "BEEP";if K=0;prt "PASSES TEST";spc 3
78: if K=1;prt "FAILS TEST";spc 3
79: for X=1 to 10;beep;wait 100;next X
80: dsp "FINISHED";wait 20000;gto 79
*4769
```

PROGRAM 9,1df 9:4 SERIES CHECK OF CALIBRATION

```
0: prt "CHECK OF 41-4";prt "SERIES SENSOR"
1: enp "4200 SEL. CODE?",P
2: fxd 0
3: ent "CHANNEL?",D;ent "SENSOR?",E
4: prt "CHANNEL",D;prt "SENSOR",E
5: wrt P,D,"N";wrt P,E,"S";wrt P,"80MORODAP";beep
6: dsp "SET 25A TO 0dBm";stp
7: dsp "DEPRESS 25A ZERO BUTTON";stp
8: dsp "WAIT--ZERO SETTLING TIME";wait 30000
9: dsp "ZEROING";wrt P,"Z";beep
10: dsp "RELEASE 25A ZERO BUTTON";stp
11: dsp "1 MILLIWATT CAL. "
12: wrt P,"80MAP";wait 5000
13: wrt P,"K";wait 2000;for X=1 to 20;red P,A,B,H;A+C}C;next X;C/20}A
14: if A>1.00045;0}A}C;gto -1
15: if A<.99965;0}A}C;gto -2
16: 0}A}C;beep
17: dsp "SET 25A TO -59dBm";stp
18: dsp "DEPRESS 25A ZERO BUTTON";stp
19: wrt P,"81MA";red P,A,B,H;prt "AUTO=",A;wrt P,"80MABOROD"
20: dsp "RESETTLE TO ZERO";wait 20000
21: dsp "REZEROING"
22: wrt P,"Z";spc 1
23: 3}G
24: dsp "RELEASE 25A ZERO BUTTON";stp
25: flt 3;0}J;for M=1 to 8;8-M}Z
26: for N=0 to 9 by G;9-N}Y
27: if M=6;1}G
28: fxd 3;0}C
29: if Y=9;if Z>4;wait 7000
30: wait 1200;if Z>4;wait 4000;if Z>6;wait 9000;gto +2
31: for J=1 to 10;red P,A,B,H;A+C}C;next J;C/10}C;gto 33
32: for J=1 to 40;red P,A,B,H;A+C}C;next J;C/40}C;gto 64
33: jmp Y+1
34: .05}I;gto "compare"
35: .05}I;gto "compare"
36: .06}I;gto "compare"
37: .07}I;gto "compare"
38: .07}I;gto "compare"
39: .08}I;gto "compare"
40: .08}I;gto "compare"
41: .09}I;gto "compare"
42: .09}I;gto "compare"
43: .1}I;gto "compare"
44: "compare":fxd 3;prt "STD",-(Y+Z10-20),"RDG",C,"TOL",I;spc 1
45: if C<-10Z+20-Y-I;spc 1;gto 52
46: if C>-10Z-Y+20+I;spc 1;gto 52
47: if M+N#16;if Y=0;fxd 0;dsp "INCREASE LEVEL 1dBm";stp ;fxd 3;next M
48: if M+N#16;if Z=1;fxd 0;dsp "INCREASE LEVEL 1dBm";stp ;fxd 3;next N
49: if M+N#16;fxd 0;dsp "INCREASE LEVEL 3dBm";stp ;fxd 3;next N
50: if M+N=16;prt "TEST COMPLETE";wrt P,"80MAB"
```

```
51: cli 7;gto "BEEP"
52: prt "FAILED";spc 1;1}K;if M=1;gto 55
53: if M=2;if Y=9;gto 55
54: gto 60
55: if F=3;prt "Unit is'nt working properly";end
56: 1+F}F;0}K;prt "RESTART"
57: dsp "SET 25A TO -59dBm";stp ;spc 1
58: dsp "DEPRESS 25A ZERO BUTTON";stp
59: gto 20
60: if M+N=16;gto 50
61: if Y=0;gto 47
62: if Z=1;gto 48
63: if M+N#16;gto 49
64: jmp Y+1
65: .1}I;gto "compare"
66: .15}I;gto "compare"
67: .2}I;gto "compare"
68: .3}I;gto "compare"
69: .3}I;gto "compare"
70: .4}I;gto "compare"
71: .4}I;gto "compare"
72: .5}I;gto "compare"
73: .5}I;gto "compare"
74: .6}I;gto "compare"
75: "BEEP":if K=0;prt "PASSES TEST";spc 3
76: if K=1;prt "FAILS TEST";spc 3
77: for X=1 to 10;beep;wait 100;next X
78: dsp "FINISHED";wait 20000;gto 77
*23142
```

```
PROGRAM 10,ldf 10:5 SERIES CHECK OF CALIBRATION


0: prt "CHECK OF 41-5";prt "SERIES SENSOR"
1: enp "4200 SEL. CODE?",P
2: fxd 0
3: ent "CHANNEL?",D;ent "SENSOR?",E
4: prt "CHANNEL",D;prt "SENSOR",E
5: wrt P,D,"N";wrt P,E,"S";wrt P,"80MORODAP";beep
6: dsp "SET 25A TO 0dBm";stp
7: dsp "DEPRESS 25A ZERO BUTTON";stp
8: dsp "WAIT--ZERO SETTLING TIME";wait 30000
9: dsp "ZEROING";wrt P,"Z";beep
10: dsp "RELEASE 25A ZERO BUTTON";stp
11: dsp "1 MILLIWATT CAL. "
12: wrt P,"80MAP";wait 5000
13: wrt P,"K";wait 2000;for X=1 to 20;red P,A,B,H;A+C)C;next X;C/20)A
14: if A>1.00045;0)A)C;gto -1
15: if A<.99965;0)A)C;gto -2
16: 0)A)C;beep
17: dsp "SET 25A TO -49dBm";stp
18: dsp "DEPRESS 25A ZERO BUTTON";stp
19: wrt P,"81MA";red P,A,B,H;prt "AUTO=",A;wrt P,"80MABOROD"
20: dsp "RESETTLE TO ZERO";wait 20000
21: dsp "REZEROING"
22: wrt P,"Z";spc 1
23: 3)G
24: dsp "RELEASE 25A ZERO BUTTON";stp
25: flt 3;0)J;for M=2 to 9;9-M)Z;Z-1)Z
26: for N=0 to 9 by G;9-N)Y
27: if M=7;1)G
28: fxd 3;0)C
29: if Y=9;if Z>3;wait 7000
30: wait 1200;if Z>3;wait 4000;if Z>5;wait 9000;gto +2
31: for J=1 to 10;red P,A,B,H;A+C)C;next J;C/10)C;gto 33
32: for J=1 to 40;red P,A,B,H;A+C)C;next J;C/40)C;gto 64
33: jmp Y+1
34: .05)I;gto "compare"
35: .05)I;gto "compare"
36: .06)I;gto "compare"
37: .07)I;gto "compare"
38: .07)I;gto "compare"
39: .08)I;gto "compare"
40: .08)I;gto "compare"
41: .09)I;gto "compare"
42: .09)I;gto "compare"
43: .1)I;gto "compare"
44: "compare":fxd 3;prt "STD",-(Y+Z10-20),"RDG",C,"TOL",I;spc 1
45: if C<-10Z+20-Y-I;spc 1;gto 52
46: if C>-10Z-Y+20+I;spc 1;gto 52
47: if M+N#17;if Y=0;fxd 0;dsp "INCREASE LEVEL 1dBm";stp ;fxd 3;next M
48: if M+N#17;if Z=0;fxd 0;dsp "INCREASE LEVEL 1dBm";stp ;fxd 3;next N
49: if M+N#17;fxd 0;dsp "INCREASE LEVEL 3dBm";stp ;fxd 3;next N
50: if M+N=17;prt "TEST COMPLETE";wrt P,"80MAB"
```

```
51: cli 7;gto "BEEP"
52: spc 1;prt "FAILED";spc 1;1)K;if M=2;gto 55
53: if M=3;if Y=9;gto 55
54: gto 60
55: if F=3;prt "Unit is'nt working properly";end
56: 1+F)F;0)K;prt "RESTART"
57: dsp "SET 25A TO -49dBm";stp ;spc 1
58: dsp "DEPRESS 25A ZERO BUTTON";stp
59: gto 20
60: if M+N=17;gto 50
61: if Y=0;gto 47
62: if Z=0;gto 48
63: if M+N#17;gto 49
64: jmp Y+1
65: .1)I;gto "compare"
66: .15)I;gto "compare"
67: .2)I;gto "compare"
68: .3)I;gto "compare"
69: .3)I;gto "compare"
70: .4)I;gto "compare"
71: .4)I;gto "compare"
72: .5)I;gto "compare"
73: .5)I;gto "compare"
74: .6)I;gto "compare"
75: "BEEP";if K=0;prt "PASSES TEST";spc 3
76: if K=1;prt "FAILS TEST";spc 3
77: for X=1 to 10;beep;wait 100;next X
78: dsp "FINISHED";wait 20000;gto 77
*30986
```

```
PROGRAM 11,1df 11:RECORDER OUT ADJUSTMENT


0: prt "RECORDER OUT"
1: prt "ADJUST"
2: ent "4200 SEL. CODE?",P
3: ent "CHANNEL IN USE?",B;wrt P,B,"N";wrt P,"81M3550L"
4: ent "SENSOR IN USE?HOOK TO 25A(2510)",D;wrt P,D,"S";wrt P,"80MAP"
5: dsp "RELEASE 25A(2510) ZERO BUTTON";stp
6: dsp "CONNECT DVM TO 4200 RECORDER";stp
7: dsp "SET 25A(2510) TO 1.000mW";stp
8: ent "DVM READING?",C;C+.02)C;red P,A,B,E;wrt P,"81ML";red P,L,B,E
9: if 10A-.01<=C;if C<=10A+.01;wrt P,"80MAP";gto 11
10: 10A/C*L)A;wrt P,"81M",A,"L";wrt P,"80MAP"
11: dsp "SET 25A(2510) TO 0.126mW";stp
12: if 10A+.01>=C;if 10A-.01<=C;gto 15
13: wait 2500;red P,A,B,E;fxd 2;dsp "SET DISPLAY POT FOR",10A,"VOLTS";stp
14: gto 7
15: ent "ENTER DVM READING?",C;red P,A,B,E;if 10A+.01>=C;if 10A-.01<=C;gto 17
16: gto 13
17: fxd 0;wrt P,"80MAP";cli 7;dsp "DONE",L;end
18: wait 10000;gto -1
*2686
```

PROGRAM 12,1df 12:ENTER A CAL.FACTOR

```
0: ent "4200 SELECT CODE?",P
1: fxd 2
2: ent "SENSOR #?",Z;wrt P,Z,"S"
3: fxd 0;enp "SENSOR SER. #?",K;wrt P,"81M";wrt P,K,"H"
4: for X=0 to 7;fxd 0;dsp X,"GHZ. CAL.FACTOR DB.?";fxd 2;ent "",A
5: prt A;fxd 0;wrt P,"82M";wrt P,X,"A";wrt P,X,"F";fxd 2;wrt P,A,"D"
6: next X
7: wrt P,"8A25.5F",A,"D";fxd 0;wrt P,"0A"
8: wrt P,"80MAB"
9: prt "Done";cli 7;end
*9885
```

PROGRAM 13,ldf 13:ENTER B CAL.FACTOR

```
0: ent "4200 SELECT CODE?",P
1: fxd 2
2: ent "SENSOR #?",Z;wrt P,Z,"S"
3: fxd 0;enp "SENSOR SER. #?",K;wrt P,"81M";wrt P,K,"H"
4: for X=1 to 7;fxd 0;dsp 2X-2,"GHZ. CAL.FACTOR DB.?";fxd 2;ent "",A
5: prt A;fxd 0;wrt P,"82M";wrt P,X-1,"A";wrt P,2X-2,"F";fxd 2;wrt P,A,"D"
6: next X
7: wrt P,"7A25.5F",A,"D"
8: fxd 0;wrt P,"0A"
9: wrt P,"80MAB"
10: prt "Done";cli 7;end
*1609
```

```
PROGRAM 14,1df 14:LOAD C CAL.FACTOR


0: ent "4200 SELECT CODE?",P
1: fxd 2;ent "4-C IS SENSOR # ?",C
2: wrt P,"81M";wrt P,C,"S"
3: ent "SENSOR SER.#?   ",A;wrt P,A,"H"
4: dsp "ENTERING DATA -- WAIT"
5: wrt P,"82M"
6: for X=1 to 10;wrt P,X-1,"A";wrt P,2X-2,"F";wrt P,"0D";next X
7: wrt P,"0A";wrt P,"80MAP"
8: cli 7;dsp "4-C CAL FACTOR DATA IS IN";beep;wait 100;beep;end
*12009
```

PROGRAM 15,1df 15:ENTER E,N4240A,N4241A CAL.FACTOR

```
0: ent "4200 SELECT CODE?",P
1: fxd 2
2: ent "SENSOR #?",Z;wrt P,Z,"S"
3: fxd 0;enp "SENSOR SER. #?",K;wrt P,"81M";wrt P,K,"H"
4: for X=1 to 10;fxd 0;dsp 2X-2,"GHZ. CAL.FACTOR DB.?";fxd 2;ent "",A
5: prt A;fxd 0;wrt P,"82M";wrt P,X-1,"A";wrt P,2X-2,"F";fxd 2;wrt P,A,"D"
6: next X
7: fxd 0;wrt P,"0A"
8: wrt P,"80MAB"
9: prt "Done";cli 7;end
*19290
```

```
PROGRAM 16,ldf 16:PRINTOUT 4200 DATA ON EXTERNAL PRINTER


0: dim A$[200],B$[200]
1: ent "ENTER # OF CHANNELS",D
2: ent "ENTER # OF SENSORS",G
3: ent "ENTER 4200 SELECT CODE",P
4: "     THIS SHEET IS A STEP BY STEP PROCEDURE FOR REENTERING THE "}A$
5: wrt 728,A$
6: "CALIBRATION INTO THE NON-VOLATILE MEMORY OF THIS INSTRUMENT,"}A$
7: wrt 728,A$
8: "BOONTON ELECTRONICS MODEL 4200 R.F.MICROWATTMETER SERIAL NUMBER  "}A$
9: wait 500;ent "4200 SERIAL NUMBER?",A$[len(A$)]
10: wrt 728,A$,","
11: "WITH THE FOLLOWING POWER SENSOR(S):"}A$;wrt 728,A$;wait 1000
12: "                                    SENSOR  "}A$
13: ent " SENSOR NUMBER? ",A$[len(A$)]
14: "  TYPE  "}B$
15: ent " TYPE? ",B$[len(B$)];wrt 728,A$,B$
16: ent "MORE SENSORS? 0/YES,1/NO",T;if T=0;gto 12
17: dsp "PRINTOUT IN PROGRESS--WAIT"
18: wrt 728
19: "     CARE SHOULD BE TAKEN TO MAKE SURE THE BIT SWITCH IS CONFIGURED"}A$
20: wrt 728,A$
21: "PER INSTRUCTIONS. THE BIT SWITCH IS LOCATED UNDER THE TOP COVER"}A$
22: wrt 728,A$
23: "OF THE 4200 IN THE REAR LEFT-HAND CORNER. ALSO BE CERTAIN THAT THE"}A$
24: wrt 728,A$
25: "NUMBERS YOU ENTER AGREE EXACTLY WITH THE NUMBERS ON THIS PRINTOUT."}A$
26: wrt 728,A$
27: wrt 728
28: "   DATA IS ENTERED TOP TO BOTTOM,LEFT TO RIGHT.IF A MISTAKE IS MADE,"}A$
29: wrt 728,A$
30: "DEPRESS THE CLR BUTTON AND START AT THE TOP OF THAT ENTRY AGAIN."}A$
31: wrt 728,A$
32: wrt 728
33: "     NOTE- C.F. dB.  IS A DEPRESSION OF THE CAL FACTOR dB. BUTTON"}A$
34: wrt 728,A$
35: wrt 728
36: fmt 1,79"-";wrt 728.1
37: "BIT SWITCH 1 - OPEN ,BIT SWITCH 2 - CLOSED"}A$;wrt 728,A$;wait 500
38: wrt 728.1
39: dim E[100]
40: for X=1 to D;wrt P,"81M"
41: wrt P,X,"N"
42: for Y=0 to 6;wrt P,Y,"OR";red P,E[Y+1],B,E;next Y
43: fmt 2,3x,f1.0,5x,"1000",5x,"0",8x,"1",8x,"2",8x,"3",8x,"4",8x,"5",8x,"6"
44: wrt 728.2,X
45: fmt 3,2x,"CHNL",3x,"AUTO",3x,7"HOLD     "
46: wrt 728.3
47: fmt 4,2x,f4.0,5x,7f9.0;wrt P,"L";red P,A,B,E
48: wrt 728.4,A,E[1],E[2],E[3],E[4],E[5],E[6],E[7]
49: fmt 5,3x,"LO",10x,7"dB REF    ";wrt 728.5
50: wrt 728.1
```

```
51: next X
52: 5D}C;C+17}C
53: for X=1 to G
54: if C+24>56;wtb 728,12;0}C
55: "BIT SWITCH 1 - OPEN, BIT SWITCH 2 - CLOSED"}A$;wrt 728,A$
56: wrt 728.1
57: wrt P,"81M",X,"S"
58: wrt P,"H";red P,H,B,E;wrt P,"D";red P,D,B,E;wrt P,"F";red P,F,B,E
59: fmt 6,4f13.0
60: wrt 728.6,X,H,D,F
61: fmt 6,4c14
62: wrt 728.6,"SENS","HI    ","C.F.dB  ","GHZ.   "
63: wrt 728.1
64: "BIT SWITCH 1 - CLOSED, BIT SWITCH 2 - OPEN"}A$;wrt 728,A$
65: wrt 728.1
66: wrt P,"82M";for Y=0 to 6;wrt P,Y,"OR";red P,E[Y+1],B,E;next Y
67: fmt 2,10x,"0",8x,"1",8x,"2",8x,"3",8x,"4",8x,"5",8x,"6"
68: wrt 728.2
69: fmt 7,3x,5x,7"HOLD     "
70: wrt 728.7
71: fmt 4,3x,7f9.0;wrt 728.4,E[1],E[2],E[3],E[4],E[5],E[6],E[7]
72: fmt 5,7x,7"dB REF    ";wrt 728.5
73: for Y=0 to 5;wrt P,Y,"OH";red P,E[Y+1],B,E;next Y
74: fmt 4,2x,6f9.0
75: wrt 728.4,abs(E[1]),abs(E[2]),abs(E[3]),abs(E[4]),abs(E[5]),abs(E[6])
76: "  "}A$
77: for Y=0 to 5;if sgn(E[Y+1])=-1;gto +2
78: "          "}A$[len(A$)+1];gto +2
79: "      CHS"}A$[len(A$)+1]
80: next Y
81: wrt 728,A$
82: fmt 2,9x,6"HI       "
83: wrt 728.2
84: wait 500
85: wrt 728.1
86: fmt 2,11c7,;wrt 728.2,"0","1","2","3","4","5","6","7","8","9","0"
87: fmt 2," ",11"   AUTO"
88: wrt 728.2
89: for L=0 to 9;wrt P,L,"AF";red P,E[L+1],B,E;wrt P,"D";red P,E[L+11],B,E
90: next L
91: wrt P,"0A"
92: fmt 2,10f7.1
93: for L=1 to 10;abs(E[L+10])}E[L+20];next L
94: wrt 728.2,E[1],E[2],E[3],E[4],E[5],E[6],E[7],E[8],E[9],E[10]
95: fmt 2,4x,10"GHZ     "
96: wrt 728.2;wait 500
97: fmt 2,x,10f7.2
98: wrt 728.2,E[21],E[22],E[23],E[24],E[25],E[26],E[27],E[28],E[29],E[30]
99: " "}A$
100: for L=1 to 10;if sgn(E[L+10])=-1;gto +2
```

```
101: "        "}A$[len(A$)+1];gto +2
102: "   CHS "}A$[len(A$)+1]
103: next L
104: wrt 728,A$
105: fmt 2,4x,10"C.F.    "
106: wrt 728.2
107: fmt 2,"     ",10"dB      "
108: wrt 728.2;wait 500
109: wrt 728.1
110: C+24}C;next X
111: "BIT SWITCH 1-CLOSED, BIT SWITCH 2-CLOSED"}A$
112: wrt 728,A$
113: wrt 728.1
114: wtb 728,12
115: wrt P,"1N1S80M0R0DAB";cli 7
116: wait 10000;dsp "TURN 4200 POWER OFF AND PROCEED"
*10994
```

```
PROGRAM 17,ldf 17:RE-ENTER 4200 DATA FROM PRINTOUT


0: ent "4200 SELECT CODE ?",P
1: ent "RECORDER OUT # ? (LO)",A
2: wrt P,"81M",A,"L"
3: ent "CHANNEL ?",A;wrt P,A,"N"
4: for X=0 to 6;fxd 0;dsp "RANGE",X,"D.C. GAIN CONSTANT";ent "",A
5: wrt P,X,"0",A,"R";next X
6: ent "DO ANOTHER CHANNEL?,1=YES,0=NO",A
7: if A=1;gto 3
8: wrt P,"81M";ent "SENSOR # ?",A;wrt P,A,"S"
9: ent "SENSOR SERIAL # ? (HI)",A;wrt P,A,"H"
10: ent "SENSOR TYPE ? (C.F.dB)",A;wrt P,A,"D"
11: ent "SENSOR ATTEN.? (GHZ)",A;wrt P,A,"F"
12: wrt P,"1000A"
13: wrt P,"82M"
14: for X=0 to 6;dsp "RANGE",X,"A.C.GAIN CONSTANT";ent "",A
15: wrt P,X,"0",A,"R"
16: if X=6;gto 19
17: dsp "RANGE",X,"DOWNSCALE CORRECTION?";ent "",A
18: wrt P,A,"H";next X
19: ent "DO ANOTHER SENSOR?1=YES,0=NO",A
20: if A=1;gto 8
21: wrt P,"80M1N1SORODAB";cli 7;dsp "FINISHED";end
*3240
```

```
PROGRAM 18,1df 18:SENSOR PRINTOUT ON 9825A PRINTER


0: ent "4200 SELECT CODE ?",P
1: ent "SENSOR TO BE PRINTED?",A
2: prt "OPEN SWITCH 1";prt "CLOSE SWITCH 2"
3: prt "HIT NUMBER YOU";prt "WANT SENSOR  TO";prt "BE"
4: spc 1;prt "            SENS"
5: spc 1
6: wrt P,A,"S";wrt P,"81M"
7: wrt P,"H";red P,A,B,C;fxd 0;prt A,"               HI";spc 1
8: wrt P,"F";red P,A,B,C;prt A,"             GHZ";spc 1
9: wrt P,"D";red P,A,B,C;prt A,"     CAL FACT DB";spc 1
10: prt "OPEN SWITCH 2";prt "CLOSE SWITCH 1"
11: wrt P,"82M"
12: for X=0 to 6;wrt P,X,"OR";red P,A,B,C;prt X,"            HOLD"
13: prt A,"          DB REF";spc 1;next X
14: for X=0 to 5;wrt P,X,"OH";red P,A,B,C;prt X,"            HOLD",abs(A)
15: if sgn(A)=-1;prt "             CHS"
16: prt "               HI"
17: spc 1;next X
18: spc 1
19: for X=0 to 9;wrt P,X,"AF";red P,A,B,C
20: fxd 0;prt X,"            AUTO",A,"             GHZ"
21: fxd 2;wrt P,"D";red P,A,B,C;prt abs(A)
22: if sgn(A)=-1;prt "             CHS"
23: prt "     CAL FACT DB"
24: spc 1;next X;wrt P,"0A"
25: prt "CLOSE SWITCHES";prt "1 AND 2"
26: wrt P,"80MAB";cli 7;spc 3;end
*18178
```

PROGRAM 19,ldf 19:PRINTOUT 4200 DATA ON 9825A PRINTER

```
0: dim A$[2];dim B$[4];ent "4200 SELECT CODE?",P
1: fxd 0;beep;wait 100;beep;ent "CHANNELS?",A$
2: beep;wait 100;beep;ent "SENSORS ?",B$
3: beep;wait 100;beep
4: ent "UNIT SER. # ?",F;prt "UNIT SER. #",F
5: if val(A$[1,1])=0;gto 13
6: wrt P,"81ML";red P,A,B,H;prt "REC.OUT=",A;spc 2
7: len(A$)}D;for E=1 to D;wrt P,val(A$[E,E]),"N"
8: prt "CHANNEL",val(A$[E,E])
9: for X=0 to 6;wrt P,X,"O";wrt P,"R"
10: red P,B,C,H;fxd 0;prt "RANGE",X,"D.C.GAIN CONST.=",B;spc 1
11: next X
12: spc 3;next E
13: if val(B$[1,1])=0;gto 28
14: len(B$)}G;for W=1 to G;wrt P,val(B$[W,W]),"S"
15: fxd 0;prt "SENSOR NUMBER",B$[W,W]
16: wrt P,"81M"
17: wrt P,"H";red P,A,B,H;prt "SENS.SER.#",A
18: wrt P,"D";red P,A,B,H;prt "SENS.TYPE",A
19: wrt P,"F";red P,A,B,H;prt "SENS.ATTEN",A
20: wrt P,"A";red P,A,B,H;prt "AUTO CONST.",A
21: spc 1
22: wrt P,"82M"
23: for X=0 to 6;wrt P,X,"O";wrt P,"R";red P,A,B,H
24: fxd 0;prt "RANGE",X,"A.C.GAIN CONST=",A
25: if X#6;wrt P,"H";red P,A,B,H;prt "DOWNSCALE CORR.=",A
26: spc 1;next X
27: spc 3;next W
28: wrt P,"80MAP"
29: cli 7;spc 1;end
*1116
```

MP MASTER
MA25190